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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/828,437	04/21/2004	Shosuke Endoh	252112US2	5495
22850	7590	05/02/2007		
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER DHINGRA, RAKESH KUMAR	
			ART UNIT 1763	PAPER NUMBER
			NOTIFICATION DATE 05/02/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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**Office Action Summary**

Application No.

10/828,437

Applicant(s)

ENDOH ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 4-8 and 11-27 is/are pending in the application.
- 4a) Of the above claim(s) 4-7, 11 and 22-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8 and 12-21 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***DETAILED ACTION***

***Claim Objections***

In terms of CFR 1.121, in the claim listing, the status of every claim must be indicated after its claim number by using one of the following identifiers in a parenthetical expression: (Original), (Currently amended), (Canceled), (Withdrawn), (Previously presented), (New), and (Not entered).

In the present case, identifier of claim 11 (withdrawn claim – claim was indicated as no-elected in applicant's response dated 4/21/06 to Restriction requirement) is shown as "Currently Amended" instead of being shown as "Withdrawn".

Necessary correction is required in response to this office action.

***Specification***

The specification was objected (in the last office action) as indicated below:

The use of the trademark Galden (for example at page 10, line 33) has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

In his response dated 11/5/06, the applicant has not added generic terminology for GALDEN wherever it appears in the specification.

Necessary correction to the specification is required to be done in this respect.

***Response to Arguments***

Applicant's arguments with respect to claims 1-3, 8-10,12-21 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

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Applicant has amended independent claims 8, 11-15, 18, 19 by adding new limitations, for example in claim 8 –“said focus ring being mounted on said electrostatic chuck, said electrostatic chuck having a chuck device to which a chuck voltage is applied, and said electrostatic chuck attracting said focus ring by electrostatic attraction generated by the chuck voltage applied to said chuck device” and “said heat exchange means comprising a groove provided in said contact surface and filled with a heat transfer medium; and a controller that controls the chuck voltage applied to said chuck device, said controller changing the chuck voltage in accordance with each of sequences of a plasma process; wherein said controller sets the chuck voltage applied to the chuck device high during at least one processing sequence”.

Further, claims 1-3, 9 and 10 were cancelled.

Accordingly claims 4-8, 11-15, 18, 19, 22-27 are pending out of which claims 4-7, 11 (claim indicated as not pertaining to the elected species by the applicant in his response dated 4/21/06, to the Restriction Requirement) and 22-27 are withdrawn. Thus claims 8 and 12-21 are active.

New reference (US Patent no. 6,125,025 – Howald et al) when combined with Koshiishi et al reads on amended claim 8 limitations. Accordingly claim 8 has been rejected under 35 USC 103 (a) as explained below. Further, remaining claims 12-21 have also been rejected under 35 USC 103 (a) as explained below.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 8, 12, 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koshiishi et al (US PG PUB No. 2003/0106647) in view of Howald et al (US Patent No. 6,125,025).**

Regarding Claim 8: Koshiishi et al teach a plasma processing apparatus (Figures 1, 4) comprising:

a holder main body (susceptor) 11 having an electrostatic chuck (through dielectric films 14a, 14b) on which is mounted a wafer W that is subjected to plasma processing and a focus ring 12 having a contact surface is disposed in contact with said electrostatic chuck around a periphery of wafer W, the focus ring 12 is mounted on the electrostatic chuck having a chucking device (electrodes 11a, 11b) to which a DC voltage 15 is applied and the focus ring is attracted by electrostatic attraction to the electrostatic chuck by the chucking voltage applied to electrodes 11a, 11b;

a heat exchange means for cooling the wafer W and the focus ring 12 that comprises a heat transfer medium (Helium gas) flowing through gas supply path (groove) 17 in the holder main body 11 (at the contact surface) [paragraphs 0038, 0043];

Koshiishi et al teach that for attracting the wafer and the focus ring different voltages are applied from power supply 15 through switch 24 that is controlled by a switch controller 25 (like a controller) as

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per sequence of processing of wafer (that is supply of voltage to chucking electrode 11a, for chucking the substrate is controlled by a controller) [paragraphs 0055-0059].

Koshiishi et al do not explicitly teach that the controller sets the chuck voltage applied to the chuck device high during at least one processing sequence.

Howald et al teach a plasma processing apparatus (Figures 1) comprising an electrostatic chuck 30 mounted in chamber 10 and connected to a programmed DC power source 38 for processing a substrate 32. Howald et al further teach that during initial processing of workpiece 32, voltage at terminal 40 is 5000 volts (high) and subsequently during processing the voltage reduces with respect to point 42. Howald et al also teach that supply of voltage from DC power source 38 is controlled by a computer system 64 (controller) as per sequence of process steps. Howald et al additionally teach that DC power source voltage is also varied in response to flow sensor 70 to maintain constant chucking force (column 9, line 5 to column 17, line 10).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control the supply of chucking voltage to chucking device (including supplying high voltage during initial processing ) by the controller as taught by Howald et al in the apparatus of Koshiishi et al et al as per sequence of processing steps in the program and for workpieces having intermediate resistivity (column 16, lines 10-30).

Regarding Claims 12, 16: Koshiishi et al teach holder main body (susceptor) 11 with a focus ring 12 and a heat exchange means for cooling the wafer W and the focus ring 12 that comprises a heat transfer medium (Helium gas) flowing through gas supply path (groove) 17 in the holder main body (chuck) 11 (paragraphs 0038, 0043).

Regarding Claim 18: Koshiishi et al teach an electrode 11b built into the chuck device that faces the focus ring 12 (Figure 4).

Regarding Claim 17: Koshiishi et al in view of Howald et al teach all limitations of the claim including pressure sensor that in combination with microprocessor 66 (part of controller) controls the pressure of heat transfer gas (column 16, lines 40-65).

**Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koshiishi et al (US PG PUB No. 2003/0106647) in view of Howald et al (US Patent No. 6,125,025) as applied to Claim 8 and further in view of Kanno et al (US PGUB No. 2003/0164226).**

Regarding Claim 13: Koshiishi et al in view of Howald et al teach all limitations of the claim including groove for heat transfer medium but do not teach depth of groove. Kanno et al teach an apparatus (Figure 3) that includes a wafer stage 52 with gas grooves 60. Kanno et al further teach depth of gas groove as 0.5 mm (greater than 0.1 mm as per claim limitation) and that depth is optimized based upon proper flow of heat transfer medium around the outer periphery of wafer (paragraph 0071).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize depth of groove as taught by Kanno et al in the apparatus of Koshiishi et al in view of Howald et al to achieve proper flow of heat transfer medium for efficient cooling of focus ring.

Regarding Claims 14,15: Kanno et al teach that groove has rounded corner and also comprise annular shape concentric with focus ring (Figure 5).

**Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koshiishi et al (US PG PUB No. 2003/0106647) in view of Howald et al (US Patent No. 6,125,025) as applied to Claim 16 and further in view of Huang (US PG PUB no. 2004/0005726).**

Regarding Claims 19, 20: Koshiishi et al in view of Howald et al teach all limitations of the claim except that heat exchange medium reduces temperature of focus ring to at least below 20 degrees C below the temperature of electrostatic chuck.

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Huang teach an apparatus (Figures 3, 5A, 5B) that includes an electrostatic chuck 16 with a temperature controlled focus ring 52 having heat transfer means 54. Huang further teach that heat transfer means controls the temperature of focus ring to within a range of 100 degrees C +/- 30 degrees C, which is higher than the claim range of (temperature lower by 20 degrees C below that of chuck). Huang also teaches that a controller enables controlling temperature of focus ring to a pre-set value and it would be obvious to control the temperature of focus ring as per process limitations ([paragraph 0025, 0041-0043].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control temperature of focus ring using emperature control means as taught by Huang in the apparatus of Koshiishi et al in view of Howald et al as per process limitations like amount of radicals to be adsorbed by the focus ring (paragraph 0023).

Regarding Claim 21: Huang teach that apparatus comprises heat transfer means that can heat the focus ring (paragraph 0041).

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



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Art Unit 1763